

US EPA ARCHIVE DOCUMENT

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**Proposed  
Total Maximum Daily Loads  
for the  
Gee Creek and Soldiers Creek  
Watersheds**

**WBIDS: 2994A & 2986**

**Lead**

**September 30, 2009**



**Region4** serving the  
southeast

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## SUMMARY SHEET

### Total Maximum Daily Load (TMDL)

1. 303(d) Listed Segment: WBID – 2994A and 2986 Gee Creek and Soldier Creek -- Middle St. Johns River
2. TMDL Endpoints/Targets: Water quality standard for lead based on hardness: Lead
3. TMDL Technical Approach: Percent reduction to meet calculated water quality criterion based upon water hardness.
4. TMDL Waste Load and Load Allocation

WBID	Name	Load Reduction (LA)	MS4 Stormwater			NPDES	Silver Concentration µg/l (WLA)
			Permit Number	County	NPDES Stormwater (WLA)		
2994A	Gee Creek	49%	FLS000038	Seminole County	49%		NA
2986	Soldiers Creek	52%	FLS000038	Seminole County	45%	FL0171565	45%

5. Endangered Species Present: No
6. USEPA Lead TMDL or Other: EPA
7. TMDL Considers Point Sources/Non Point Sources: Both
8. Major NPDES Discharges to surface waters addressed in TMDL: Yes

## 1. Introduction

Section 303(d) of the Clean Water Act requires each state to list those waters within its boundaries for which technology based effluent limitations are not stringent enough to protect any water quality standard applicable to such waters. Listed waters are prioritized with respect to designated use classifications and the severity of pollution. In accordance with this prioritization, states are required to develop Total Maximum Daily Loads (TMDLs) for those water bodies that are not meeting water quality standards. The TMDL process establishes the allowable loadings of pollutants or other quantifiable parameters for a waterbody based on the relationship between pollution sources and in-stream water quality conditions, so that states can establish water quality based controls to reduce pollution from both point and nonpoint sources and restore and maintain the quality of their water resources (USEPA, 1991).

The State of Florida Department of Environmental Protection (FDEP) developed a statewide, watershed-based approach to water resource management. Under the watershed management approach, water resources are managed on the basis of natural boundaries, such as river basins, rather than political boundaries. The watershed management approach is the framework FDEP uses for implementing TMDLs. The state's 52 basins are divided into five groups. Water quality is assessed in each group on a rotating five-year cycle. The Middle St. Johns is a Group 2 basins; it was scheduled for TMDL development by a consent decree. FDEP established five water management districts (WMD) responsible for managing ground and surface water supplies in the counties encompassing the districts. The Middle St. Johns is located in the St. Johns River Water Management District (SJRWMD).

For the purpose of planning and management, the WMDs divided each district into planning units defined as either an individual primary tributary basin or a group of adjacent primary tributary basins with similar characteristics. These planning units contain smaller, hydrological based units called drainage basins, which are further divided by FDEP into "water segments". A water segment usually contains only one unique waterbody type (stream, lake, canal, etc.) and is about 5 square miles in size. Unique numbers or waterbody identification (WBIDs) numbers are assigned to each water segment.

## 2. Problem Definition

The TMDLs addressed in this document are being established pursuant to commitments made by the United States Environmental Protection Agency (EPA) in the 1998 Consent Decree in the Florida TMDL lawsuit (Florida Wildlife Federation, et al. v. Carol Browner, et al., Civil Action No. 4: 98CV356-WS, 1998). That Consent Decree established a schedule for TMDL development for waters listed on Florida's EPA approved 1998 section 303(d) list. The 1998 section 303(d) list identified numerous Water Body Identifications (WBIDs) in the Middle St. Johns River Basin as not supporting water quality standards (WQS). After assessing all readily available water quality data, EPA is responsible for developing a TMDL in WBIDs 2994A and 2986, Gee Creek and Soldier Creek. The parameter being addressed in this TMDL is lead.

Most waterbodies in the Middle St. Johns River Basin are designated as Class III waters having a designated use for recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The level of impairment is denoted as threatened, partially or not supporting designated uses. A waterbody that is classified as threatened currently meets WQS but trends indicate the designated use may not be met in the next listing cycle. A waterbody classified as partially supporting designated uses is defined as somewhat impacted by pollution and water quality criteria are exceeded on some frequency. For this category, water quality is considered moderately impacted. A waterbody that is categorized as not supporting is highly impacted by pollution and water quality criteria are exceeded on a regular or frequent basis. In such waterbodies, water quality is considered severely impacted.

To determine the status of surface water quality in the state, three categories of data – chemistry data, biological data, and fish consumption advisories – were evaluated to determine potential impairments. The level of impairment is defined in the Identification of Impaired Surface Waters Rule (IWR), Section 62-303 of the Florida Administrative Code (F.A.C.). The IWR is FDEP's methodology for determining whether waters should be included on the state's planning list and verified list. (Table 1).

**Table 1 Listed WBIDS for TMDL Development**

<b>WBID</b>	<b>Name</b>	<b>Pollutant</b>	<b>Class</b>	<b>Waterbody Type</b>	<b>Basin</b>
2994A	Gee Creek	Lead	3F	Lake	<b>Middle St. Johns</b>
2986	Soldier Creek	Lead	3F	Stream	<b>Middle St. Johns</b>

The waterbodies included in this TMDL are designated as Class III Freshwaters having a designated use for recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The level of impairment is denoted as threatened, partially or not supporting designated uses. A waterbody that is classified as threatened currently meets WQS but trends indicate the designated use may not be met in the next listing cycle. A waterbody classified as partially supporting designated uses is defined as somewhat impacted by pollution and water quality criteria are exceeded on some frequency. For this category, water quality is considered moderately impacted. A waterbody that is categorized as not supporting is highly impacted by pollution and water quality criteria are exceeded on a regular or frequent basis. In such waterbodies, water quality is considered severely impacted.

To determine the status of surface water quality in the state, three categories of data – chemistry data, biological data, and fish consumption advisories – were evaluated to determine potential impairments. The level of impairment is defined in the Identification of Impaired Surface Waters Rule (IWR), Section 62-303 of the Florida Administrative Code (F.A.C.). The IWR defines the threshold for determining if waters should be included on the state's planning list and verified list. Potential impairments are determined by assessing whether a waterbody meets the criteria for inclusion on the planning list. Once a waterbody is on the planning list, additional data and information will be collected and examined to determine if the water should be included on the verified list.



### 3. Watershed Description

While the State of Florida determines use support based upon Waterbody Identification segments (WBIDs), this TMDL determines sources to an individual WBID or series of WBIDs as a function of a watershed. To determine the watershed area for a WBID the USGS National Hydrology Database Plus (NHDPlus) catchment coverage is used to delineate the contributing area. All landuses and permitted point sources (NPDES/MS4) within this watershed that have the potential to contribute to the impairment are considered in the TMDL.

A brief watershed assessment is given for each of the watersheds that are being considered in the development of this TMDL. Landuse distribution, drainage area and inventory of point sources in the watershed are identified.

#### 3.1. Gee Creek Watershed

##### 3.1.1. Description

Gee Creek watershed is located in Seminole County, in Central Florida, with an approximate drainage area of 10 square-miles (mi<sup>2</sup>). Figure 1 shows the locations of the Gee Creek watershed, WBID 2994A.

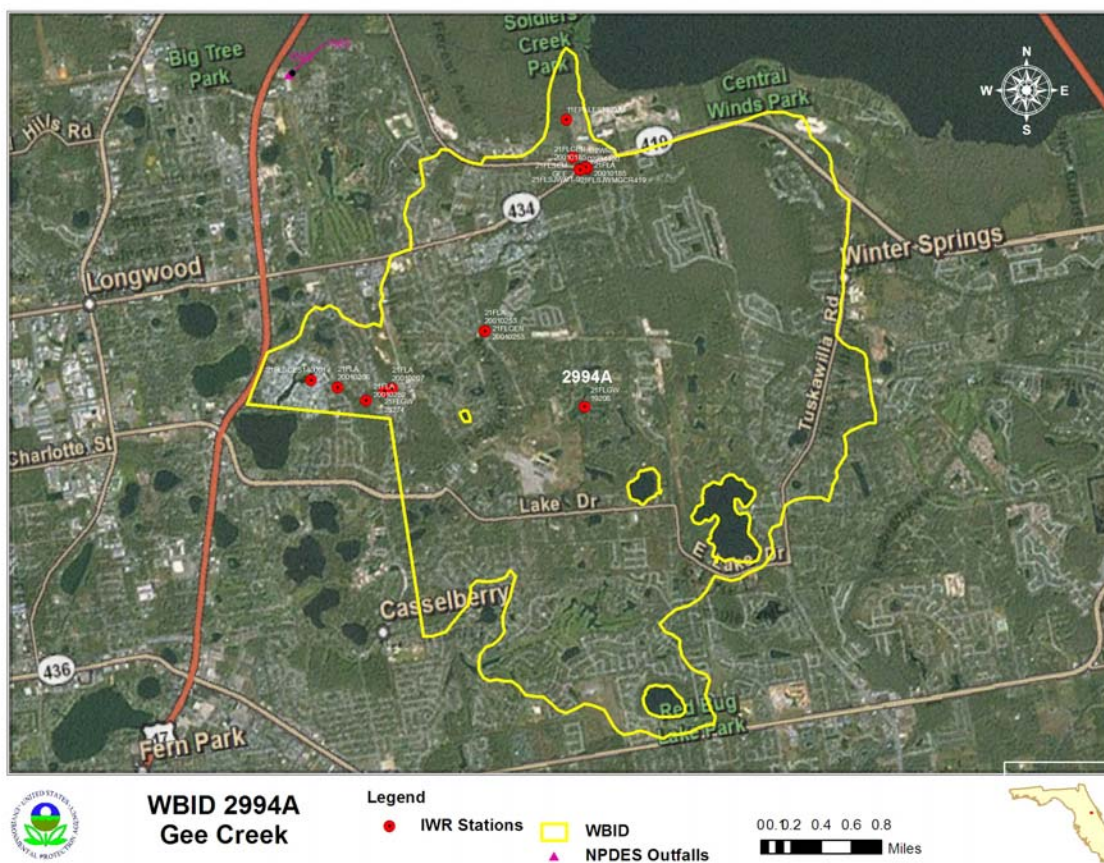


Figure 1 Gee Creek Watershed



### 3.1.2. Landuses in Watershed

Table 2 provides the landuse distribution for the Gee Creek watershed which contains WBID 2994A -- Gee Creek. The latest landuse coverages were obtained from the Florida Department of the Environment (FDEP) FTP site. The landuses are described using the Florida Landuse Classification Code (FLUCC) Level 1. The predominant landuse draining to Gee Creek is Urban (67%).

**Table 2 Gee Creek Watershed Landuses (FLUCC - Level 1)**

Subbasin Name	Land Use Name	Area (ac)	Portion of Watershed (%)
2994A	AGRICULTURE	64.8	1.01
2994A	BARREN LAND	14.3	0.22
2994A	RANGELAND	107.2	1.67
2994A	UTILITIES	183.4	2.86
2994A	UPLAND FORESTS	425.6	6.63
2994A	URBAN AND BUILT-UP	4296.6	66.96
2994A	WATER	208.8	3.25
2994A	WETLANDS	1115.8	17.39
2994A	Totals	6416.5	100

### 3.1.3. Point Source Dischargers

There are no NPDES wastewater facilities discharging in the watershed.

### 3.1.4. Municipal Separate Storm Sewer System Permittees

The Seminole County (Permit FLS000038) has a NPDES municipal separate storm sewer system (MS4) permits that include portions of the Soldier Creek. This includes the cities of Casselberry, Longwood, Lake Mary and Winter Springs.

## 3.2. Soldier Creek Watershed Description

The Soldier Creek watershed is located in Seminole County (Figure 2). The watershed drainage area is roughly 18.3-square-mile (mi<sup>2</sup>).

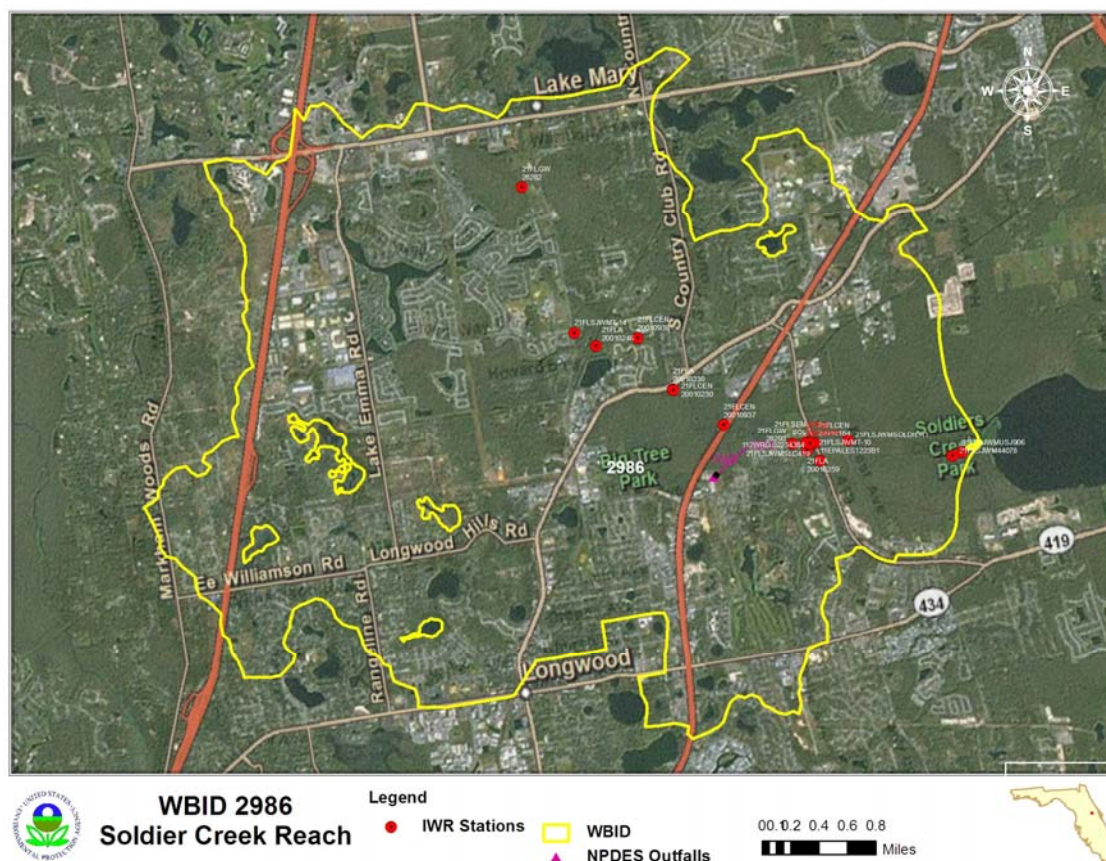


Figure 2 Soldier Creek Watershed

### 3.2.1. Landuses in the Watershed

Table 3 provides the landuse distribution for the Soldier Creek watershed which contains WBID 2986. The latest landuse coverages were obtained from the Florida Department of the Environment (FDEP) FTP site. The landuses are described using the Florida Landuse Classification Code (FLUCC) Level 1. The predominant landuse draining to the Soldier Creek watershed is Urban (60%).

Table 3 Soldier Creek Landuse Distribution (FLUCC - Level 1)

Subbasin Name	Land Use Name	Area (ac)	Portion of Watershed (%)
2986	AGRICULTURE	317	2.7
2986	BARREN LAND	2.3	0.02
2986	RANGELAND	214.6	1.83
2986	UTILITIES	770.1	6.56
2986	UPLAND FORESTS	597.2	5.09
2986	URBAN AND BUILT-UP	7003.1	59.68
2986	WATER	374.1	3.19
2986	WETLANDS	2455.5	20.93
2986	Totals	11734	100

### 3.2.2. Point Source Dischargers

There is one NPDES wastewater facilities discharging in the watershed, NPDES FL0171565 Sprague Electric.

### 3.2.3. Municipal Separate Storm Sewer System Permittees

The Seminole County (Permit FLS000038) has a NPDES municipal separate storm sewer system (MS4) permits that include portions of the Soldier Creek. This includes the cities of Casselberry, Longwood, Lake Mary and Winter Springs.

## 4. Water Quality Standards/TMDL Targets

The IWR (62-303, F.A.C.) provides the guidance under which it can be determined whether WBID 2994A Gee Creek and WBID 2986 Soldier Creek segments addressed by this TMDL report are impaired:

The IWR establishes in 62-303.400, F.A.C., that *a waterbody that fails to meet the minimum criteria for surface waters established in Rule 62-302.500, F.A.C.; any of its designated uses, as described in this part; or applicable water quality criteria, as described in this part, shall be determined to be impaired.* Under 62.302.500(2)(a) the criteria of surface water quality provided in subsection 62-302.500(2) and Rule 62-302.530, F.A.C., shall apply to all surface waters outside zones of mixing; 62.302.500(2)(d) establishes that criteria for metals in Rule 62-302.530 and paragraph 62-302.500(1)(c), F.A.C., are measured as total recoverable metal.

For these two WBIDs addressed by this TMDL report, the applicable water quality criterion for lead for the protection of Class III freshwater waters, as established by Rule 62-302.530, F.A.C., lists the *maximum concentration [for lead] that shall not be exceeded at any time for Class III freshwater waters as  $e(1.273[\text{Ln}H]-4.705)$  ug/L (where  $\text{Ln}H$  denotes the natural logarithm of hardness expressed as mg/L of  $\text{CaCO}_3$ , and  $e$  represents the exponential base) for reported values of hardness between 25 and 400; for reported values of hardness less than 25, the value of the criteria evaluated at a hardness value of 25 is used; analogously, for reported values of hardness greater than 400, the value of the criteria evaluated at a hardness value of 400 is used (62-303.320(9)(b)).*

## 5. Water Quality Assessment

To determine impairment an assessment of the available data was conducted. The source for current ambient monitoring data for WBIDs 2994A and 2986 was the Impaired Waters Rule Database (IWR) run 35.

Prior to performing the assessments required to verify lead impairments for the two WBIDs, it was first necessary to unduplicate the data; and to subject the data to QA procedures to cull out those result values which were reported at or below detection limits having method detection limits which could not quantify results as low as the criterion value from the Florida Standards (62-303.320, F.A.C.); as well as those result values which were reported below quantification limits.

The culled result records reporting below quantification limits where the calculated value of the criteria was between the detection limit and the quantification limit also could not

be used, since for these results it is not possible to determine the relationship between the criterion value and the result.

The sections below report the culled data compared to the water quality criterion for lead.

## 5.1. Water Quality Data

The tables and figures below present the station locations, the number of samples taken and table of data used to calculate the TMDL for each WBID.

### 5.1.1. 2994A -- Gee Creek

For WBID 2994A – Gee Creek there were a total of 3 stations reporting measured lead concentrations, there were a total 47 observations, of these stations only 26 observations were usable after the culling procedure described in Section 5 (Table 4).

**Table 4 Gee Creek Lead Station Data Summary**

Station ID	Station Name	Begin Date	End Date	# of Obs
21FLCEN 20010185	Gee Creek at S.R. Highway 419	5/24/1999 0:00	10/8/2007 12:37	5
21FLCEN 20010253	GEE CREEK AT MOSS RD DOWNSTR STP	2/21/2007 9:03	10/8/2007 12:53	4
21FLSEM GEE	Gee Creek	12/30/1998 0:00	4/1/2008 0:00	38

Table 5 provides the data used to calculate the lead criterion as a function of hardness and presents the observed lead concentrations for Gee Creek. The observations that exceed the calculated water quality criterion are shaded in red.

**Table 5 Ambient Monitoring Data, Calculated Criterion based on Hardness, Measured Lead Concentration (µg/l)**

Station	Date/Time	Hardness	Calculated	Observed
21FLCEN 20010185 Y	2/21/2007 8:47	103.47	2.81	0.26
	5/14/2007 10:50	127.84	3.65	0.28
	7/23/2007 12:08	115.19	3.21	0.45
	10/8/2007 12:37	84.79	2.20	0.62
21FLCEN 20010253 Y	5/14/2007 11:10	105.96	2.90	0.54
	7/23/2007 12:26	82.91	2.14	0.27
	10/8/2007 12:53	55.82	1.31	0.33
21FLSEM GEE Y	8/16/2000	160.00	4.82	3.00
	9/26/2000	130.00	3.73	3.00
	11/14/2000	140.00	4.09	3.00
	2/13/2001	160.00	4.82	3.00
	5/15/2001	140.00	4.09	3.00
	8/15/2001	120.00	3.38	3.00
	11/19/2001	130.00	3.73	3.00
	2/12/2002	130.00	3.73	3.00
	5/14/2002	130.00	3.73	3.00
	8/8/2002	77.00	1.95	3.00
	11/13/2002	88.00	2.30	3.00
	2/4/2003	86.00	2.24	3.00
	5/6/2003	97.00	2.60	3.00
	8/7/2003 12:15	70.00	1.73	3.00
	11/17/2003 10:30	81.00	2.08	3.00
	2/17/2004 10:10	93.00	2.46	4.80
	3/15/2004 10:00	88.00	2.30	4.30
	5/10/2004 11:30	110.00	3.03	3.00
	7/6/2004 9:15	170.00	5.20	3.00

**5.1.2. 2986 – Soldier Creek**

For WBID 2986 – Soldier Creek there were a total of 5 stations reporting measured lead concentrations (Table 6). Before culling there were a total of 50 observations, after culling there were 26 observations used in the assessment of these 10 exceeded (38%) the calculated water quality criterion.

**Table 6 Soldier Creek Lead Station Data Summary**

Station ID	Station Name	Begin Date	End Date	# of Obs
21FLCEN 20010184	Soldier Creek 100 yards downstream of S.R. Highway 419	5/24/1999 0:00	5/24/1999 0:00	1
21FLCEN 20010230	SOLDIER CREEK AT SR #427 MIDSTRE	2/21/2007 9:47	10/8/2007 11:46	4
21FLCEN 20010937	Soldier Creek @ US 17/92	2/21/2007 9:33	10/8/2007 11:29	4
21FLCEN 20010938	Soldier Creek @ Crystal Creek Drive	2/21/2007 10:00	10/8/2007 12:00	4
21FLSEM SOL	Soldiers Creek	12/30/1998 0:00	4/1/2008 0:00	37



Table 7 provides the data used to calculate the lead criterion as a function of hardness and presents the observed lead concentrations for Soldiers Creek. The observations that exceed the calculated water quality criterion are shaded in red.

**Table 7 Ambient Monitoring Data, Calculated Criterion based on Hardness, Measured Lead Concentration (µg/l).**

Station	Date/Time	Hardness	Calculated	Observed
21FLCEN 20010230 X	2/21/2007 9:47	65.6823	1.86	0.29
	7/23/2007 10:57	90.2874	2.79	0.63
	10/8/2007 11:46	72.5724	2.12	0.81
21FLCEN 20010937 Y	2/21/2007 9:33	77.5664	2.30	0.25
	5/14/2007 12:05	128.1926	4.36	0.22
	7/23/2007 10:37	99.776	3.17	0.96
	10/8/2007 11:29	80.9744	2.43	0.68
21FLCEN 20010938 Y	7/23/2007 11:17	85.6309	2.61	0.37
	10/8/2007 12:00	62.0109	1.73	0.61
21FLSEM SOL Y	8/16/2000	120	4.01	3
	9/26/2000	86	2.63	3
	11/14/2000	120	4.01	3
	2/13/2001	120	4.01	3
	5/15/2001	130	4.44	3
	8/15/2001	86	2.63	3
	11/19/2001	96	3.02	3
	2/12/2002	110	3.59	3
	5/14/2002	130	4.44	3
	8/8/2002	82	2.47	3
	11/13/2002	92	2.86	3
	2/4/2003	84	2.55	3
	5/6/2003	95	2.98	3
	8/7/2003 12:30	60	1.66	3
	11/17/2003 10:45	82	2.47	3.2
	2/17/2004 10:30	86	2.63	3
	5/10/2004 12:40	110	3.59	3
	7/6/2004 10:40	120	4.01	3
	7/5/2006	110	3.59	3

## 6. Analytical Approach

The approach for the development of this TMDL is to determine a percent reduction in loadings (point sources, stormwater and non point source) based upon available data to achieve Florida's water quality standard for lead accounting for the variability in hardness. The percent reduction is calculated by taking the highest observed lead concentration for a given WBID.

$$\% \text{ Reduction} = 1 - \frac{\text{Highest Calculated Pb Concentration}}{\text{Highest Observed Lead Concentration for WBID}}$$



## 7. TMDLs

A total maximum daily load (TMDL) for a given pollutant and waterbody is comprised of the sum of individual wasteload allocations (WLAs) for point sources, and load allocations (LAs) for both nonpoint sources and natural background levels. In addition, the TMDL must include a margin of safety (MOS), either implicitly or explicitly, to account for the uncertainty in the relationship between pollutant loads and the quality of the receiving waterbody. Conceptually, this definition is represented by the equation:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

The TMDL is the total amount of pollutant that can be assimilated by the receiving waterbody and still achieve water quality standards and the waterbody's designated use. In TMDL development, allowable loadings from all pollutant sources that cumulatively amount to no more than the TMDL must be set and thereby provide the basis to establish water quality-based controls. These TMDLs are expressed as a percent reduction of observed lead concentrations to meet the applicable water quality standard. Load reductions for the nonpoint sources in each WBID, and Waste Load Allocation concentrations are given for individual NPDES-permitted facilities, are provided in Table 8. Before facilities are given their discharge limit for lead, they should monitor and report lead concentrations to determine whether they have a reasonable potential to cause and contribute to impairment. For facilities that show they do not have the potential to cause and contribute to a lead impairment they will not receive a permit limit for lead.

**Table 8 TMDL Allocations for Lead in Gee Creek and Soldier Creek**

WBID	Name	Load Reduction (LA)	MS4 Stormwater			NPDES	Silver Concentration $\mu\text{g/l}$ (WLA)
			Permit Number	County	NPDES Stormwater (WLA)		
2994A	Gee Creek	49%	FLS000038	Seminole County	49%		NA
2986	Soldiers Creek	52%	FLS000038	Seminole County	45%	FL0171565	45%

### 7.1. Critical Conditions and Seasonal Variation

USEPA regulations at 40 CFR 130.7(c)(1) require TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. The critical condition is the combination of environmental factors creating the "worst case" scenario of water quality conditions in the waterbody. By achieving the water quality standards at all times this TMDL takes into account all conditions and excluding seasonality.

### 7.2. Margin of Safety

The Margin of Safety accounts for uncertainty in the relationship between a pollutant load and the resultant condition of the waterbody. There are two methods for incorporating a MOS into TMDLs (USEPA, 1991):

- Implicitly incorporate the MOS using conservative model assumptions to develop allocations
- Explicitly specify a portion of the total TMDL as the MOS and use the remainder for allocations.

The percent reduction calculated for a given WBID was made using the highest calculated reduction based upon observations. Because this TMDL sets all allocations to the criteria until an assimilation capacity can be determined, it assures that the lead water quality criteria will be met.

## 8. References

Florida Administrative Code (F.A.C.). Chapter 62-302, Surface Water Quality Standards.

USEPA, 1991. *Guidance for Water Quality –based Decisions: The TMDL Process*. U.S. Environmental Protection Agency, Office of Water, Washington, DC. EPA-440/4-91-001, April 1991.